



Smart Energy Networks of the Future
London, Islington Town Hall, 4th July 2019



GreenSCIES- Green Smart Community Integrated Energy Systems

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ISLINGTON

What is GreenSCIES?...

GreenSCIES is a research study that will deliver a concept and design of a technically and commercially viable integrated, local, smart energy network

- Funded by Innovate UK, part of the Industrial Strategy Challenge Fund on Prospering from the Energy Revolution - BEIS.
- First of three stages, aimed to deliver a demonstrator project.

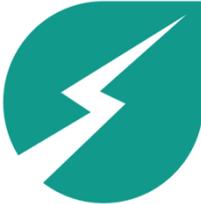
Project Objectives

- **Deliver low-carbon, affordable energy**
 - Efficient Use of heat
 - Capturing **waste heat** and using **renewable energy sources**
 - Balancing loads
 - Delivering **heating & cooling** by **sharing** heat between applications
 - Integrating new technologies
 - Transition to **EV and V2G**

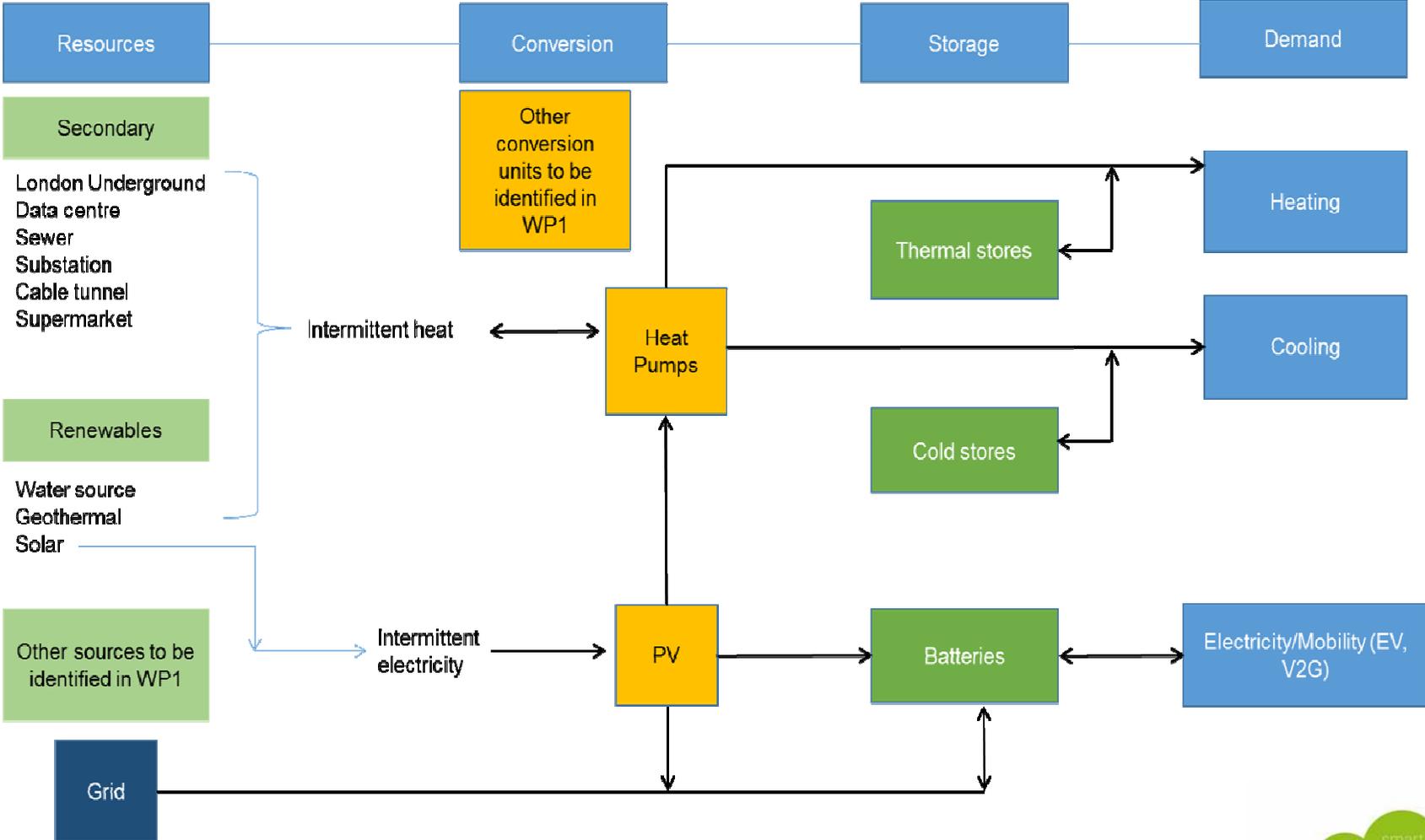
- **Design able to be used & operated in an urban environment**
 - **5th generation district heating network** with energy storage and AI optimization

- **Develop a local energy market**
 - Engaging local stakeholders to develop the **business model**

Our Team



Network Concept



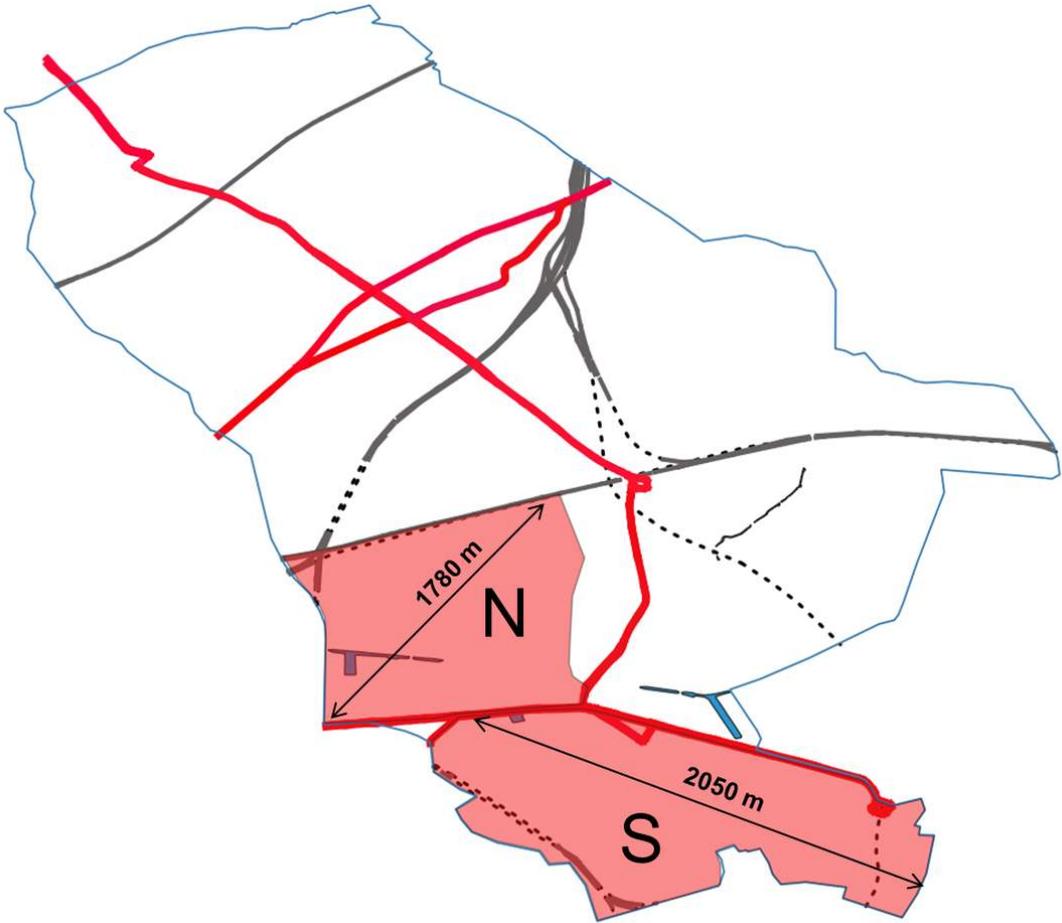
London Borough of Islington (LBI)



— LBI Borough Boundary

Major physical barriers for DH

- TfL red routes
- Railway track
- - Railway tunnel
- Surface water

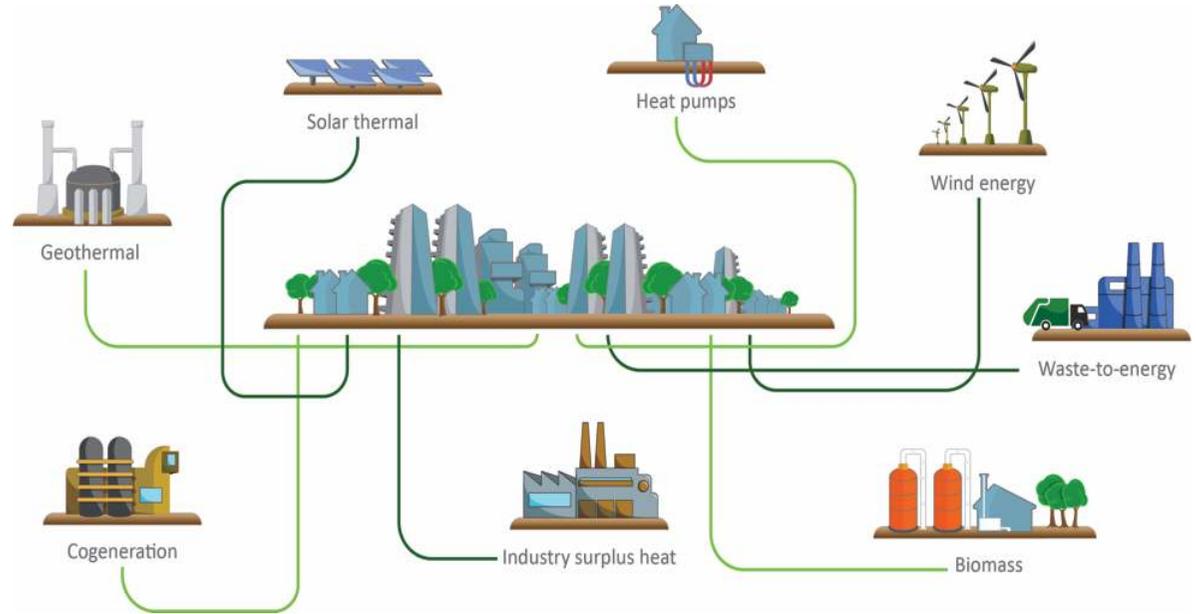


Islington has the highest population density of local authorities in England and Wales – **13,875 people/km²**



What are the smart technologies for LBI?

TECHNOLOGIES (SUPPLIES)
High temperature heat pumps
Low temperature heat pumps
High temperature solar thermal
Solar thermal
Biomass boilers
Anaerobic digestion CHP
Gas fired CHP
Fuel cells (methane or hydrogen)
PV
Wind
Batteries
Car Club EVs
Commercial EVs (vans)
Domestic EVs
V1G - Smart Charging



SOURCES
Ground water (open loop aquifers)
Surface water (Open loop rivers, canals)
Ground coupled arrays (closed loop)
Data Centres
Electricity Sub stations
Sewers
Sewage farms
Industrial waste streams
Building air conditioning systems
Tube vent shafts
Cable tunnels

Thermal network

5DHC is a different topology
With decentralised 'hub' heat pumps

Standard typology



**High-temperature network
unidirectional**

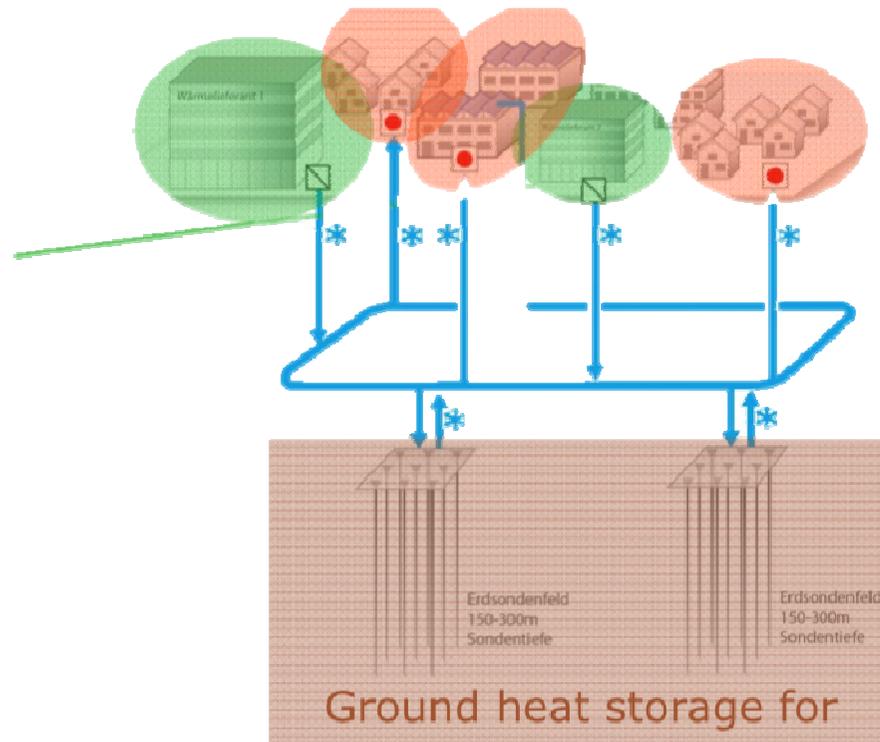
New typology



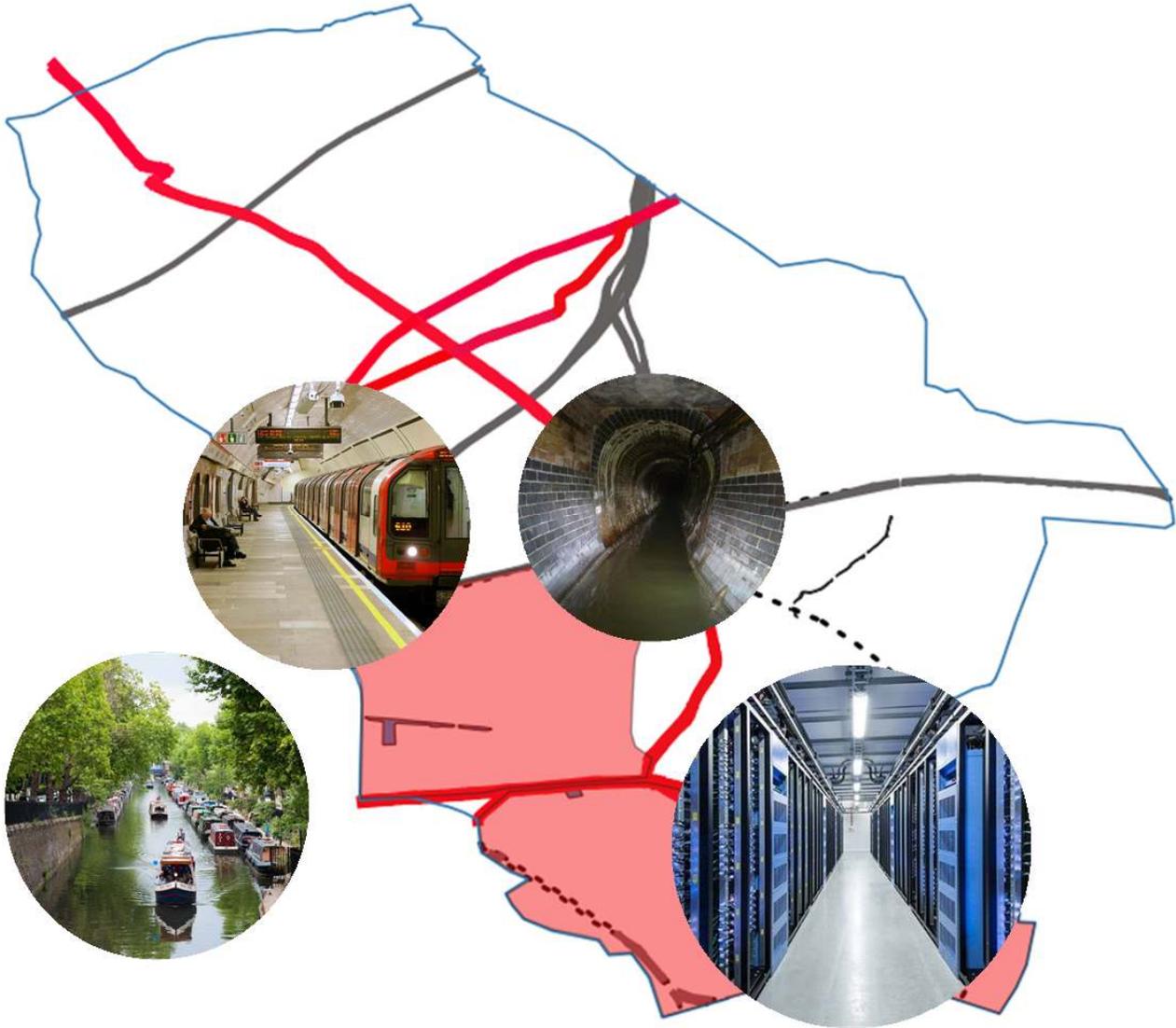
**Low-temperature network (LTN)
bidirectional**

Thermal network

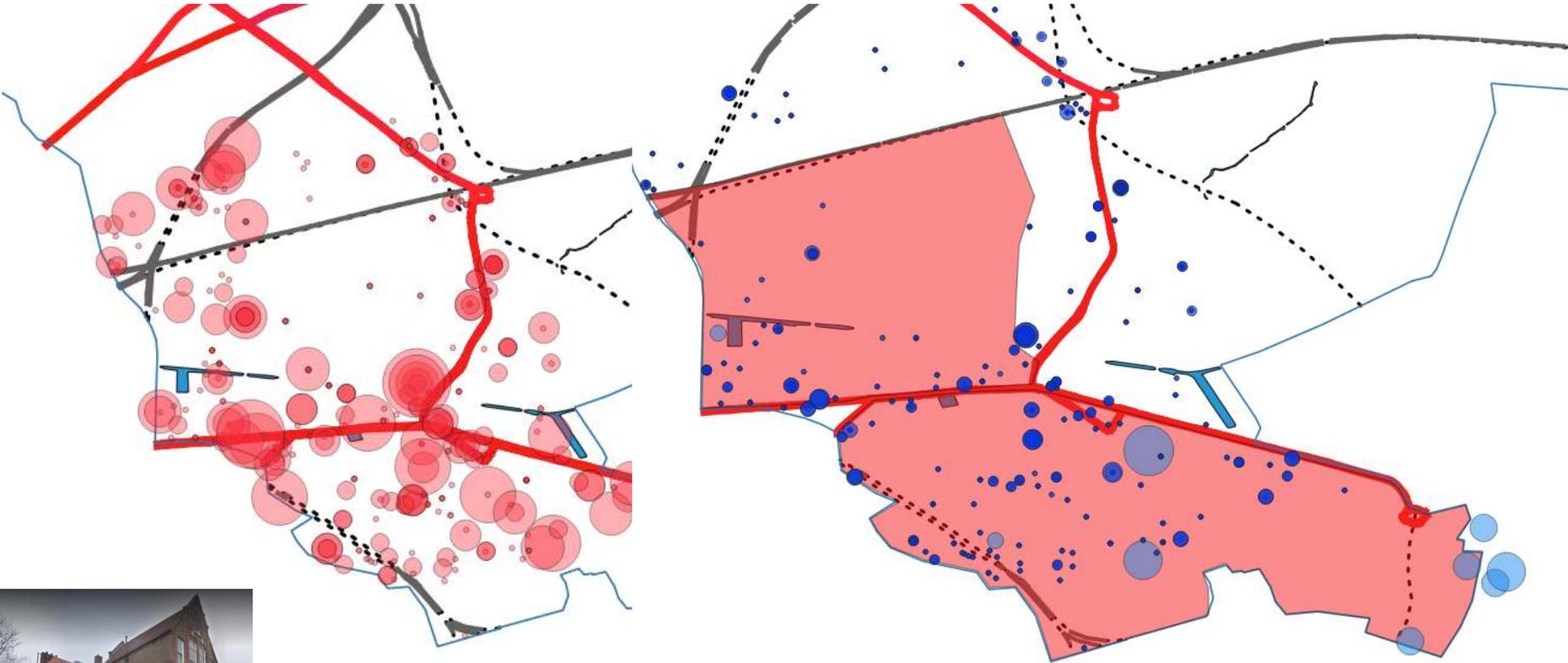
- 5DHC ultra low temperature loop needs a balancing mechanism e.g. aquifer boreholes



Low carbon heat sources



Heating and Cooling Demand



ON ENERGY

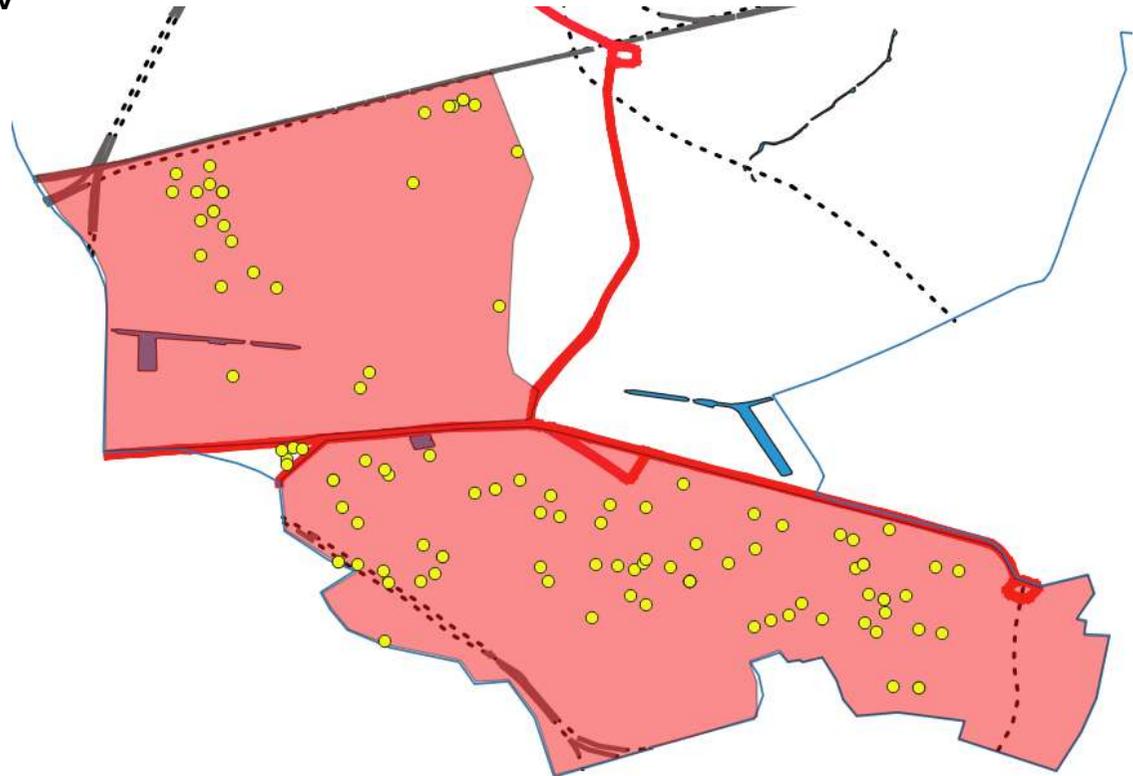
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Power

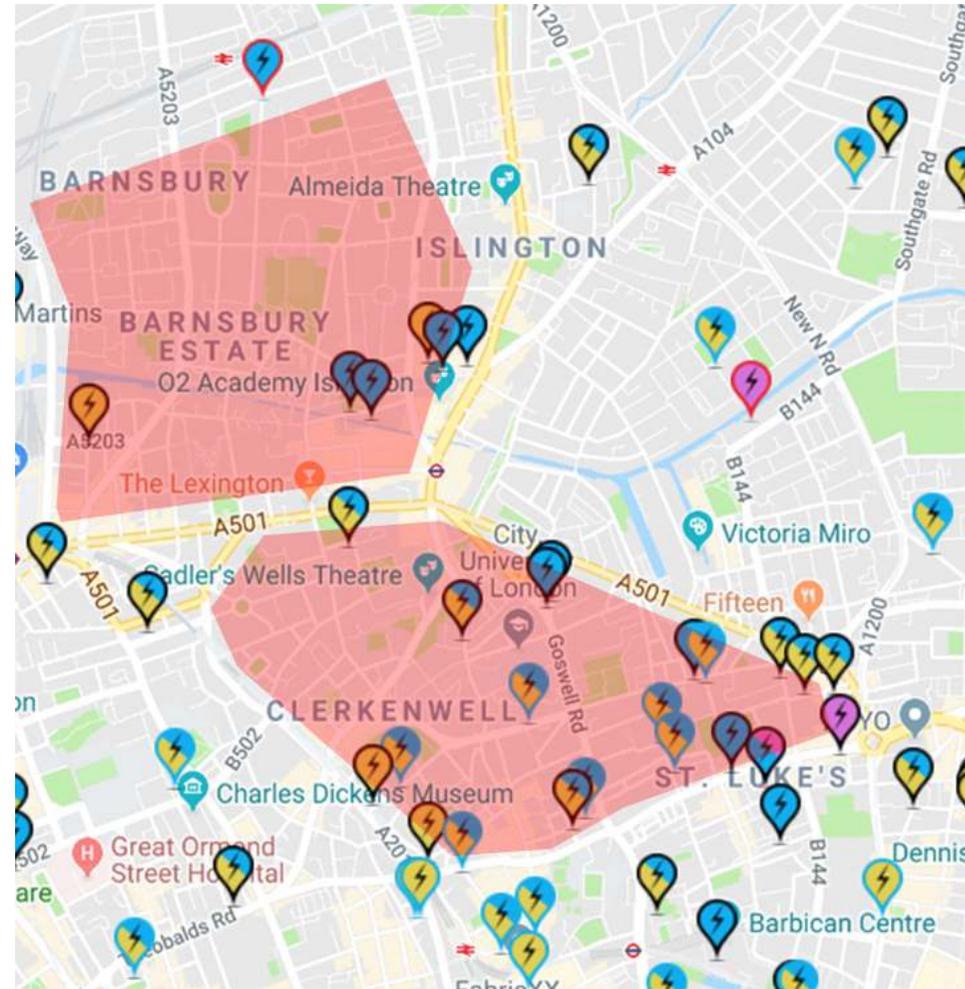
Solar Photovoltaic (PV)

- ~ 18,000 m² potential area for PV
- > 3MWp total capacity



Mobility

- EVs produce no air pollutants during operation
- **Electric storage & vehicle to grid supply**
Integrated into the GreenSCIES schemes

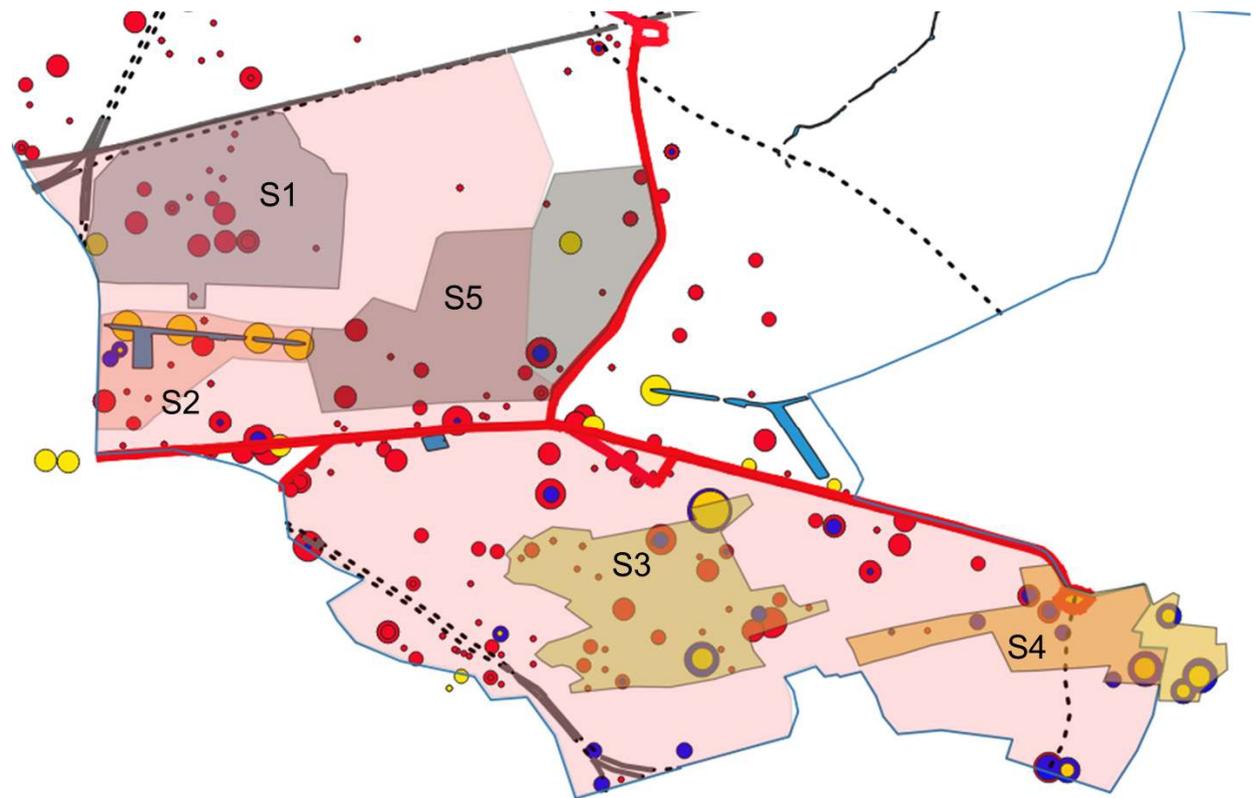


Existing charging points in Islington

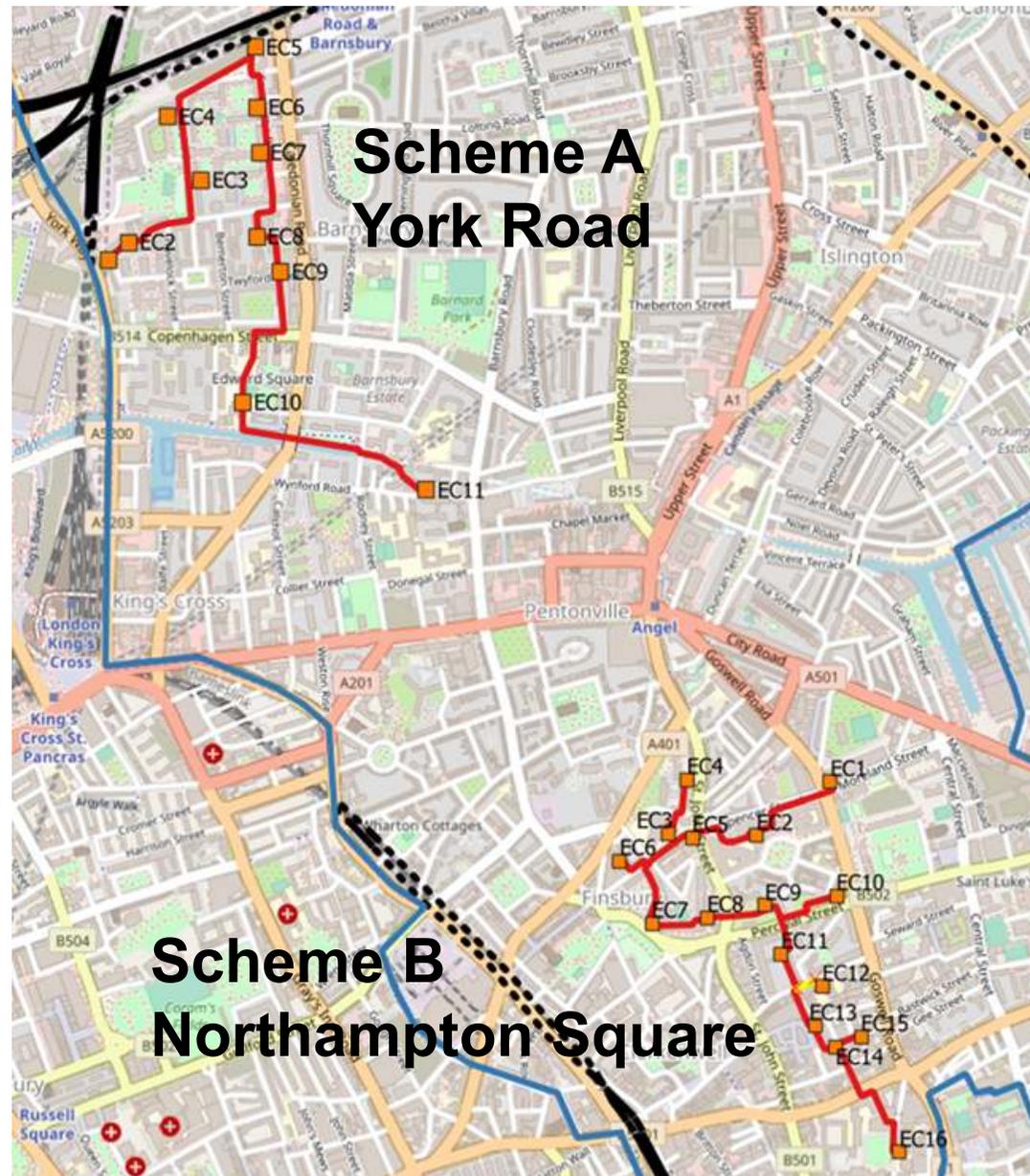
Summary data collection and analysis

- Building's energy demand
 - Energy sources
 - Roof area available for installing PV
 - Potential EV penetration scenarios for Islington
- Islington

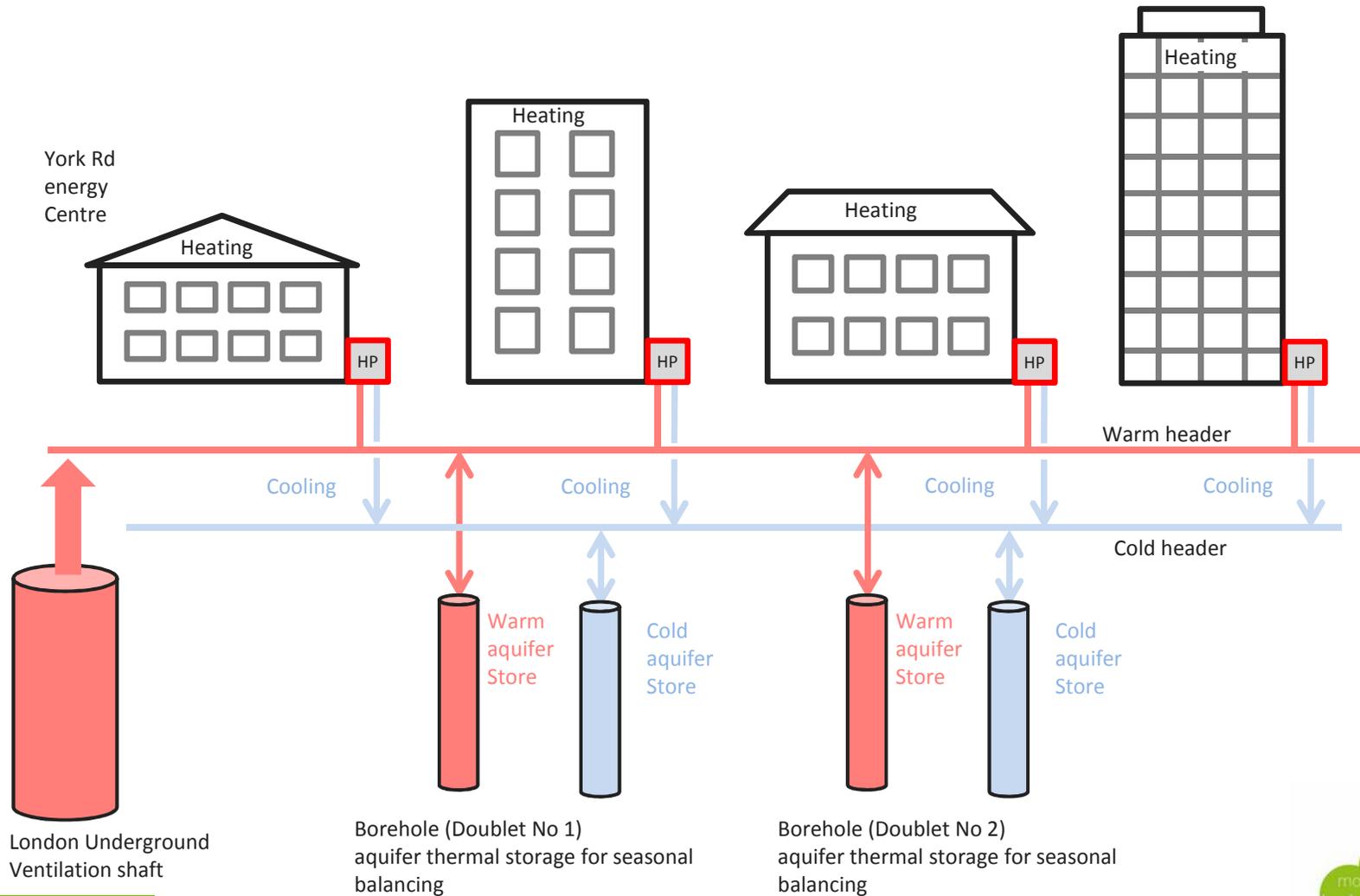
- Heating demand
- Cooling demand
- Secondary and renewable energy sources



Two viable 5th generation schemes



Scheme A – York Road Ventilation shaft & Boreholes



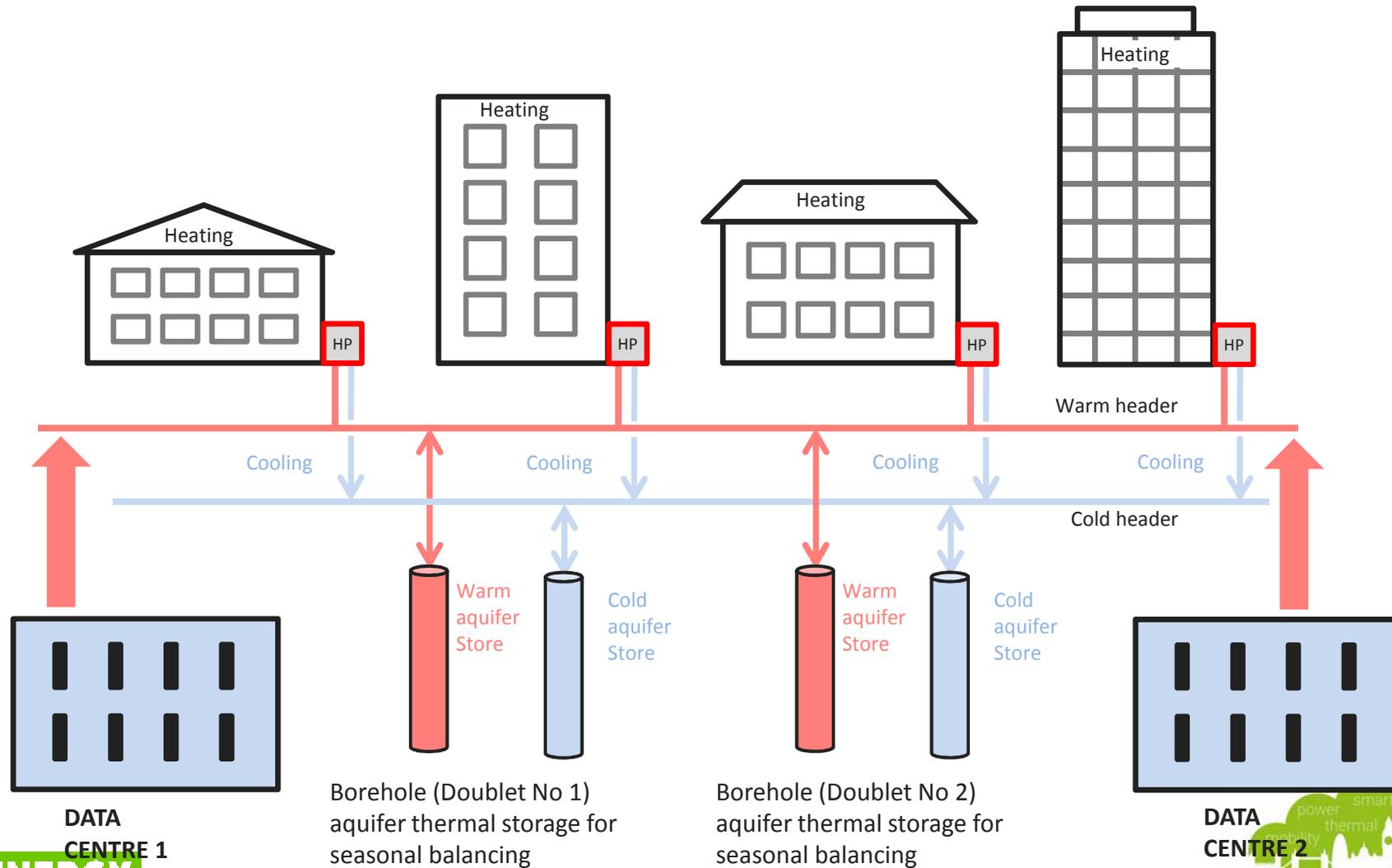
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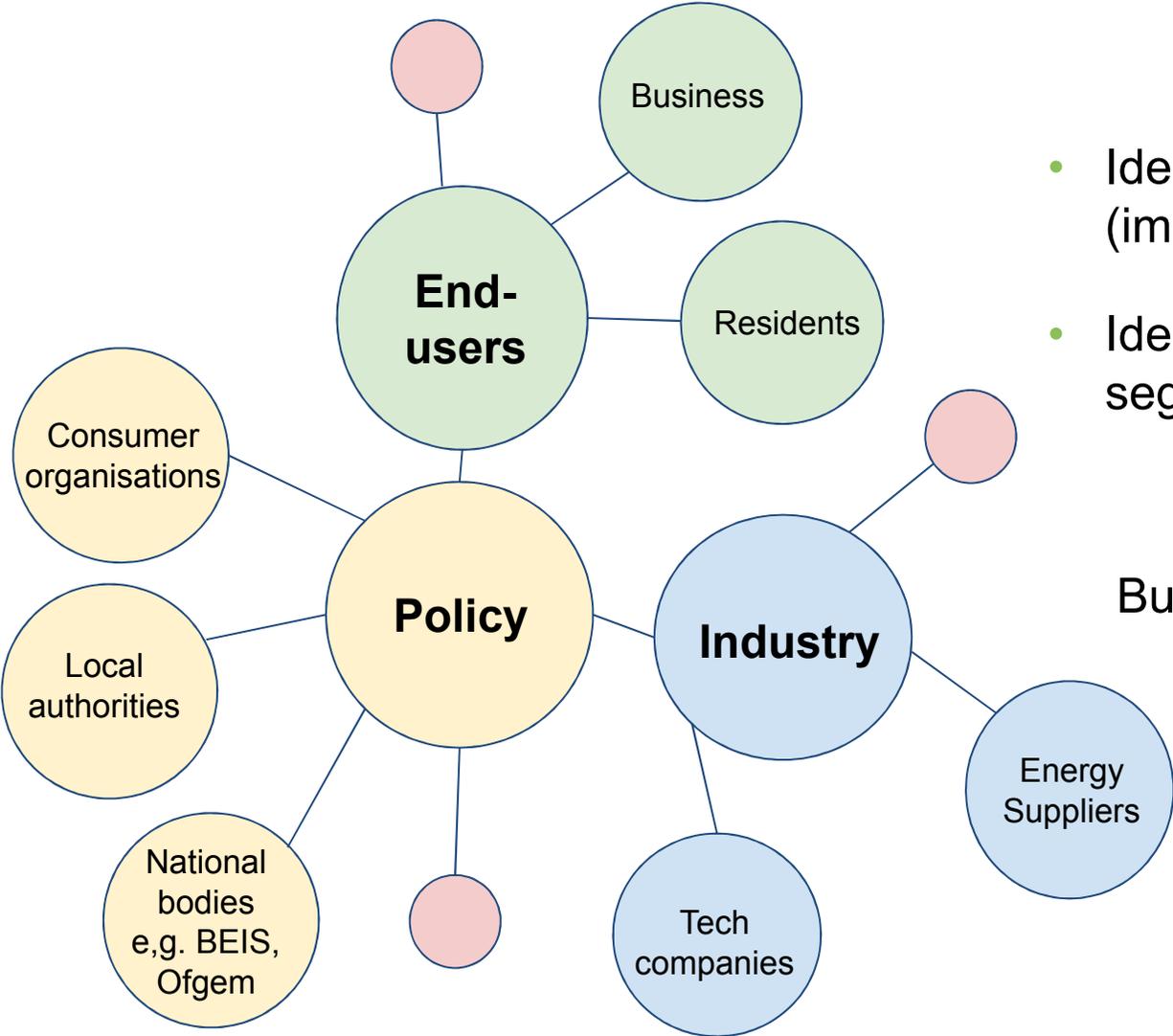
power smart
thermal
mobility
greenSCIES
Green Smart Community
Integrated Energy Systems

Scheme B – Northampton Square

Two data centres



Developing a Local Energy Market

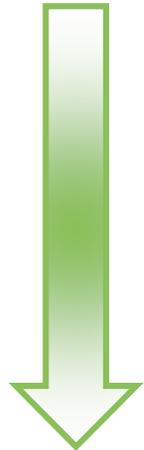


- Identifying stakeholder needs (impacts, barriers, gaps)
- Identifying customer segments & revenue streams



Business model with a value proposition for each stakeholder

Next Steps



1. **Concept feasibility study** (1st Feb – 31st Jul 2019)
2. **Detailed design** (1st Jan 2020 – 31st Dec 2021)
3. **Demonstration** (1st Jan 2022 -)
4. **Replicability** (other cities in the UK and internationally)



Thank You

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